What is claimed is:

1. A method for transferring data on power line communication ("PLC") signals over a PLC system comprising:

providing a PLC system for generating a plurality of distinct PLC carriers wherein the PLC carriers have frequencies within a predetermined operational PLC frequency spectrum; and

selecting, for each of the distinct PLC carriers, an order of modulation based on channel quality data associated with the respective distinct PLC carriers and node configuration data.

2. The method of claim 1, wherein the PLC system is an orthogonal frequency division multiplexing ("OFDM") system.

3. The method of claim 1, where the distinct PLC carriers are generated within a predetermined PLC frame structure.

4. The method of claim 3, wherein the distinct PLC carriers having the selected orders of modulation are generated for symbols having predetermined lengths included in the predetermined PLC frame structure.

5. The method of claim 1, wherein the node configuration data includes at least one of stored configuration data, real time analysis data, historical analysis data, tracking data and predication analysis data.

6. The method of claim 1 further comprising:

generating the distinct PLC carriers based on the respective selected orders of modulation and magnitude/scaling values, wherein the magnitude/scaling values are used for magnitude precompression, wherein the PLC carriers contain at least one of

information content and overhead control data, wherein the overhead control data includes the magnitude/scaling values; and

transmitting the generated PLC carriers onto the PLC system.

7. The method of claim 6 further comprising:

receiving the generated PLC carriers;

extracting the magnitude/scaling values; and

performing equalization processing on the received PLC carriers using the magnitude/scaling values.

8. A method for transferring data on power line communications ("PLC") signals over a PLC system, wherein the PLC system operates in accordance with a PLC signal frame structure, the method comprising:

obtaining at least one of channel quality and node configuration data for each of the PLC carriers;

computing, based on at least one of the channel quality and the node configuration data, PLC transmission quality estimates for each of the PLC carriers

determining an order of modulation for each of the PLC carriers by comparing, for each of the PLC carriers, PLC system thresholds with the transmission quality estimate, wherein the PLC system thresholds are representative of how many data bits can be packed ("bit packing level") onto a PLC carrier without substantially affecting data reproduction quality following PLC signal transmission; and

assigning an order of modulation to each of the PLC carriers based on the results of the comparison.

9. The method of claim 8, wherein PLC carriers are generated based on a default PLC signal frame structure design including predetermined orders of modulation for assignment to the PLC carriers, wherein the order of modulation assigned to at least of one the PLC carriers exceeds or is less than all of the predetermined orders of modulation for the default design.

10. The method of claim 8 further comprising:

transmitting from a source PLC transceiver, over the PLC system and for receipt at a destination PLC transceiver, PLC carriers generated in accordance with the frame structure;

determining at the destination PLC transceiver, from the PLC carriers transmitted from the source PLC transceiver, whether the orders of modulation used to generate the received PLC carriers are other than a single, default mode order of modulation; and

at the destination PLC transceiver, extracting information content data from the received PLC carriers based on the orders of modulation determination.

11. The method of claim 10 further comprising the steps:

(a) selecting an unevaluated PLC carrier from the PLC carriers available to be generated for a symbol by the source PLC transceiver;

(b) selecting a highest unevaluated bit packing level for the selected PLC carrier;

(c) determining whether the transmission quality estimate for the selected PLC carrier exceeds the PLC system threshold for the selected bit packing level;

(d) storing the selected bit packing value for the selected carrier if the transmission estimate for the selected PLC carrier exceeds the PLC system threshold for the selected bit packing level;

(e) if the transmission estimate for the selected PLC carrier does not exceed the PLC system threshold for the selected bit packing level, repeating steps (b) and (c) and, as suitable, the steps (d) or (e); and

(f) proceeding to step (a) as long as unevaluated PLC carriers remain.

12. The method of claim 8, wherein the PLC system includes power and communications data distribution components operating in accordance with at least one operating mode.

13. The method of claim 8, wherein the at least one operating mode includes PLC system operation in accordance with processing capabilities at a range of processing speeds.

14. The method of claim 8, wherein the PLC carriers have frequencies within a PLC frequency spectrum extending between about 2 MHz and about 80 MHz.

15. A power line communications ("PLC") transceiver for transferring data on PLC signals over a PLC system, wherein the PLC system operates in accordance with a PLC signal frame structure, the PLC transceiver comprising:

a bit unpacking module for obtaining at least one of channel quality and node configuration data for each of the PLC carriers , wherein the unpacking module performs the following operations:

(i) computes, based on at least one of the channel quality data and the node configuration data , PLC transmission quality estimates for each of the PLC carriers,

(ii) determines an order of modulation for each of the PLC carriers by comparing, for each of the PLC carriers, PLC system thresholds with the transmission quality estimate, wherein the PLC system thresholds are representative of how many data bits can be packed ("bit packing level") onto a PLC carrier without substantially affecting data reproduction quality following PLC signal transmission; and

(iii) assigns an order of modulation to each of the PLC carriers based on the results of the comparison.

16. The PLC transceiver of claim 15, wherein PLC carriers to be generated at a source PLC transceiver are generated based on a default PLC signal frame structure design including predetermined orders of modulation for assignment to the PLC carriers, wherein the order of modulation assigned to at least of one the PLC carriers exceeds or is less than all of the predetermined orders of modulation for the default design.

17. The PLC transceiver of claim 15, wherein the bit unpacking module determines whether orders of modulation of respective received PLC carriers generated for symbols of a PLC frame structure configured at a source PLC transceiver are other than those of a default PLC signal frame structure design requiring a single order of modulation for all PLC carriers, and wherein the bit unpacking module extracts information content data from the received PLC carriers based on the orders of modulation determination.

18. The PLC transceiver of claim 15, wherein the PLC system includes power and communications data distribution components operating in accordance with at least one operating mode.

19. The PLC transceiver of claim 15, wherein the at least one operating mode includes PLC system operation in accordance with processing capabilities at a range of processing speeds.

20. The PLC transceiver of claim 15, wherein the PLC carriers have frequencies within a PLC frequency spectrum extending between about 2 MHz and about 80 MHz.

21. The PLC transceiver of claim 17 further comprising:

a reprogrammable FEC decoder coupled to the bit unpacking module and capable of being programmed to perform PLC processing on the received PLC carriers modulated at respective selected orders of modulation.

22. The PLC transceiver of claim 17 further comprising:

a reprogrammable deinterleaver module coupled to the bit unpacking module and capable of being programmed to perform PLC signal processing on the received PLC carriers modulated at respective selected orders of modulation.

23. The PLC transceiver of claim 17 further comprising:

a reprogrammable fast fourier transform ("FFT") module coupled to the bit unpacking module and capable of being programmed to perform PLC signal processing on the received PLC carriers modulated at respective selected orders of modulation.

24. A power line communications ("PLC") transceiver for transferring data on PLC signals over a PLC system, wherein the PLC system operates in accordance with a PLC signal frame structure, the PLC transceiver comprising:

a bit packing module for assigning selected orders of modulation to the distinct PLC carriers to be generated for a symbol, wherein the orders of modulation are selected for the distinct PLC carriers based on PLC transmission quality estimates for each of the PLC carriers and PLC system thresholds, wherein the transmission estimates are determined based on evaluation of at least one of channel quality and node configuration data for each of the PLC carriers, wherein the PLC system thresholds are representative of how many data bits can be packed ("bit packing level") onto a PLC carrier without substantially affecting data reproduction quality following PLC signal transmission, and wherein the packing module performs the following operations:

(a) selecting an unevaluated PLC carrier from the PLC carriers available to be generated for a symbol;

(b) selecting a highest unevaluated bit packing level for the selected PLC carrier;

(c) determining whether the transmission quality estimate for the selected PLC carrier exceeds the PLC system threshold for the selected bit packing level;

(d) storing the selected bit packing value for the selected carrier if the transmission estimate for the selected PLC carrier exceeds the PLC system threshold for the selected bit packing level;

(e) if the transmission estimate for the selected PLC carrier does not exceed the PLC system threshold for the selected bit packing level, repeating steps (b) and (c) and, as suitable, the steps (d) or (e); and

(f) proceeding to step (a) as long as unevaluated PLC carriers remain.

25. The PLC transceiver of claim 24, wherein for operation in a default mode PLC carriers are generated based on a default PLC signal frame structure design including predetermined orders of modulation for assignment to the PLC carriers, wherein the order of modulation assigned to at least of one the PLC carriers exceeds or is less than all of the predetermined orders of modulation for the default design.

26. The PLC transceiver of claim 24, wherein the PLC system includes power and communications data distribution components operating in accordance with at least one operating mode.

27. The PLC transceiver of claim 24, wherein the at least one operating mode includes PLC system operation in accordance with processing capabilities at a range of processing speeds.

28. The PLC transceiver of claim 24, wherein the PLC carriers have frequencies within a PLC frequency spectrum extending between about 2 MHz and about 80 MHz.

29. The PLC transceiver of claim 24 further comprising:

a reprogrammable FEC encoder coupled to the bit packing module and capable of being programmed to perform PLC processing for generating the distinct PLC carriers modulated at respective selected orders of modulation.

30. The PLC transceiver of claim 24 further comprising:

a reprogrammable interleaver module coupled to the bit packing module and capable of being programmed to perform PLC signal processing for generating the distinct PLC carriers modulated at respective selected orders of modulation.

31. The PLC transceiver of claim 24 further comprising:

a reprogrammable inverse fast fourier transform ("IFFT") module coupled to the bit packing module and capable of being programmed to perform PLC signal processing for generating the distinct PLC carriers modulated at respective selected orders of modulation.